



[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No.FAA-2013-1041; Notice No. 25-13-40-SC]

Special Conditions: Bombardier Inc., Models BD-500-1A10 and BD-500-1A11 series airplanes; Electronic Flight Control System: Control Surface Awareness and Mode Annunciation.

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This action proposes special conditions for the Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes. These airplanes will have a novel or unusual design feature associated with control surface awareness and mode annunciation of the electronic flight control system. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Send your comments on or before **[insert a date 45 days after date of publication in the *Federal Register*]**.

ADDRESSES: Send comments identified by docket number FAA-2013-1041 using any of the following methods:

- Federal eRegulations Portal: Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

- Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.
- Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

FOR FURTHER INFORMATION CONTACT: Joe Jacobsen, FAA, Airplane and Flightcrew Interface Branch, ANM-111, Transport Airplane Directorate, Aircraft Certification Service,

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SUPPLEMENTARY INFORMATION:

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive on or before the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On December 10, 2009, Bombardier Inc. applied for a type certificate for their new Models BD-500-1A10 and BD-500-1A11 series airplanes (hereafter collectively referred to as “C-series.” The C-series airplanes are swept-wing monoplanes with a pressurized cabin. They share an identical supplier base and significant common design elements. The fuselage is aluminum alloy material, blended double-bubble fuselage, sized for nominal 5-abreast seating. Each airplane’s powerplant consists of two under wing Pratt and Whitney PW1524G ultra-high bypass, geared turbofan engines. Flight controls are fly-by-wire flight with two passive/uncoupled side sticks. Avionics includes five landscape primary cockpit displays. The dimension of the airplanes encompass a wingspan of 115 feet; a height of 37.75 feet; and a length of 114.75 feet for the Model BD-500-1A10 and a length of 127 feet for the Model BD-500-1A11. Passenger capacity is designated as 110 for the Model BD-500-1A10 and 125 for the Model BD-500-1A11. Maximum takeoff weight is 131,000 pounds for the Model BD-500-1A10

and 144,000 pounds for the Model BD-500-1A11. Maximum takeoff thrust is 21,000 pounds for the Model BD-500-1A10 and 23,300 pounds for the Model BD-500-1A11. Range is 3,394 miles (5,463 kilometers) for both models of airplanes. Maximum operating altitude is 41,000 feet for both model airplanes.

Type Certification Basis

Under the provisions of Title 14, Code of Federal Regulations (CFR) 21.17, Bombardier Inc. must show that the C-series airplanes meet the applicable provisions of 14 CFR part 25 as amended by Amendments 25-1 through 25-129 thereto.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the C-series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the C-series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36, and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

Novel or Unusual Design Features

The C-series airplanes will incorporate the following novel or unusual design features: A fly-by-wire electronic flight control system (EFCS) and no direct coupling from the flightdeck controller to the control surface. As a result, the pilot is not aware of the actual control surface position as envisioned under current airworthiness standards.

Discussion

These special conditions propose that the flightcrew receive a suitable flight control position annunciation when a flight condition exists in which nearly full surface authority (not crew-commanded) is being used. Suitability of such a display must take into account that some pilot-demanded maneuvers (e.g., rapid roll) are necessarily associated with intended full performance, which may saturate the surface. Therefore, simple alerting systems function in both intended and unexpected control-limiting situations. As a result, they must be properly balanced between providing necessary crew awareness and being a potential nuisance to the flightcrew. A monitoring system that compares airplane motion and surface deflection with the demand of the pilot side stick controller could help reduce nuisance alerting.

These special conditions also address flight control system mode annunciation. It proposes suitable mode annunciation be provided to the flightcrew for events that significantly change the operating mode of the system but do not merit the classic “failure warning.”

These special conditions establish a level of safety equivalent to that provided by a conventional flight control system and existing regulations.

Applicability

As discussed above, these special conditions are applicable to the Models BD-500-1A10 and BD-500-1A11 series airplanes. Should Bombardier Inc. apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on two model series of airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for the Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes.

1. Electronic Flight Control System: Control Surface Awareness and Mode Annunciation. In addition to the requirements of §§ 25.143, 25.671, and 25.672, the following requirements apply:

a. The system design must ensure that the flightcrew is made suitably aware whenever the primary control means nears the limit of control authority.

Note: The term “suitably aware” indicates annunciations provided to the flightcrew are appropriately balanced between nuisance and that necessary for crew awareness.

b. If the design of the flight control system has multiple modes of operation, a means must be provided to indicate to the flightcrew any mode that significantly changes or degrades the normal handling or operational characteristics of the airplane.

Issued in Renton, Washington, on November 27, 2013.

John Piccola
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service

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